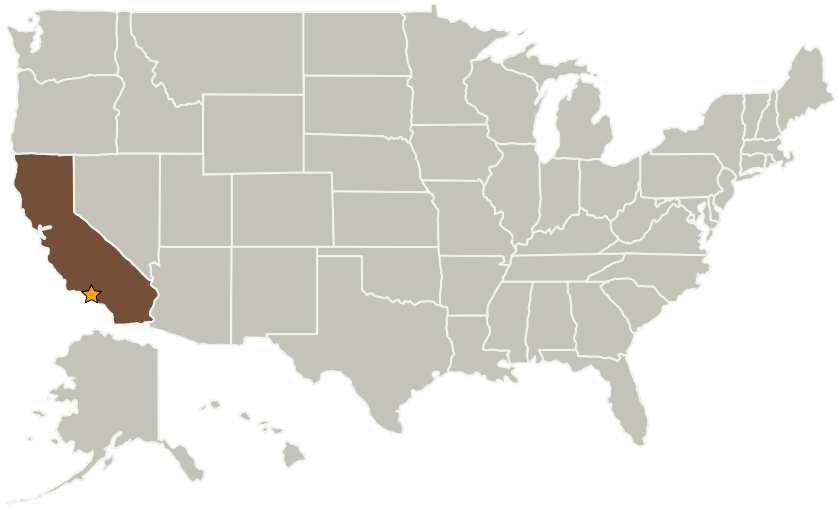
AlInGaN-Based Superlattice Terahertz Source, Phase I

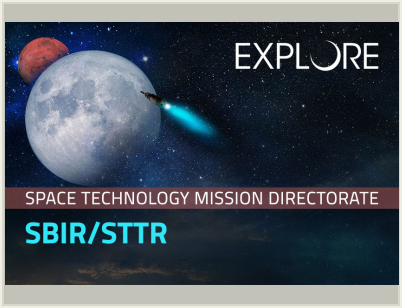
Completed Technology Project (2005 - 2005)

Project Introduction

WaveBand Corporation in collaboration with Virginia Commonwealth University proposes to design and fabricate a new sub-millimeter source based on an InAlGaN superlattice (SL). Semiconductor SLs have proven their ability to deliver high-frequency current oscillations caused by specific electron dynamics in a narrow miniband. For this project, WaveBand proposes to demonstrate SLs based on one of the GaN-family materials that deliver high temperature and high power operation superior to those provided by conventional III-V materials based on GaAs and InAs alloys. The idea of Bloch oscillators has been around for a while, yet actual example has not been demonstrated. The reason is that dc-current instability prevents oscillations at high frequency. The innovation of the proposed work is that we plan to use short-period SLs with complex miniband electron energy dispersion that suppresses the dc-instability and allows electrons to oscillate at multiples of the fundamental Bloch frequency. MBE-growth of short-period SLs will be performed using formation of spontaneous superlattices from an immiscible composition.

Primary U.S. Work Locations and Key Partners





AlInGaN-Based Superlattice Terahertz Source, Phase I

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

AlInGaN-Based Superlattice Terahertz Source, Phase I

Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Waveband Corp	Supporting Organization	Industry	Torrance, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Vladimir Litvinov

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes